Of the total number (2,807) of transits 1,855 were of equatorial spots, while 952 were of other markings. The spots immediately south of the equator are generally more abundant and conspicuous than those lying north of it.

Bishopston, Bristol:
1903 *March* 18.

On the Orbit of Σ 2525. By W. Bowyer.

(*Communicated by W. H. M. Christie.*)

This star is

B.D. + 27°, No. 3391, R.A. $19^h\ 22^m\ 30^s$ } 1900
N.P.D. 62° 52′
Mags. 7·5 and 7·7 (Σ)

In vol. liii., *Monthly Notices*, 1892 November, Mr. Gore computed an orbit of this double star from the observations extending from 1828 to 1892, the period obtained being 138·5 years.

This orbit was merely intended to draw attention to the pair, for the material at Mr. Gore's command was really insufficient to discriminate between orbital and rectilinear motion, the observation of H. Struve in 1889 not being then published. The magnitudes of the components being so nearly equal, it was impossible to tell from the observations of 1886, 1891, 1892, whether the secondary star had swept through the two quadrants 180° to 0° and had reached the fourth quadrant in 1891·5, or whether it had simply continued its motion from A to B, as shown in fig. 1.

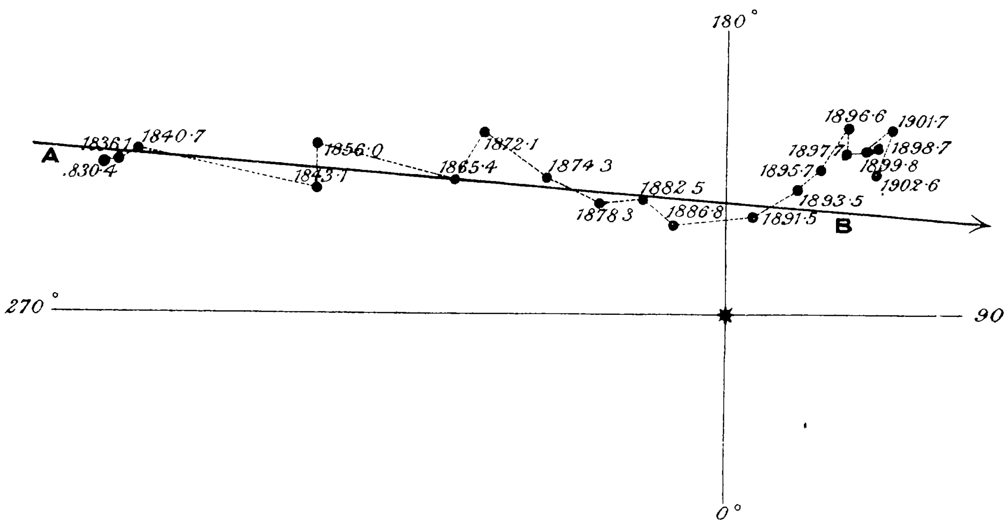
For the purposes of the present paper all available observations have been collected. The measures being in general somewhat discordant, it seemed advisable to group them, giving weights according to the number of nights. The mean places are shown in the following table. The abbreviations used are:—

Σ, W. Struve; OΣ, O. Struve; HΣ, H. Struve; Dem., Dembowski; Schiap., Schiaparelli.

Date.	Position Angle.	Distance.	Observer and Number of Nights.
	°	″	
1830·43	255·9	1·33	Σ 5.
1836·14	255·5	1·30	Σ 2.
1840·67	253·5	1·27	Dawes 1, OΣ 2.
1843·06	252·5	0·89	Maedler 2.
1855·95	247·0	0·92	OΣ 1, Secchi 2.
1865·39	243·0	0·63	Dem. 7, OΣ 2, Engelmann 1, Secchi 1.

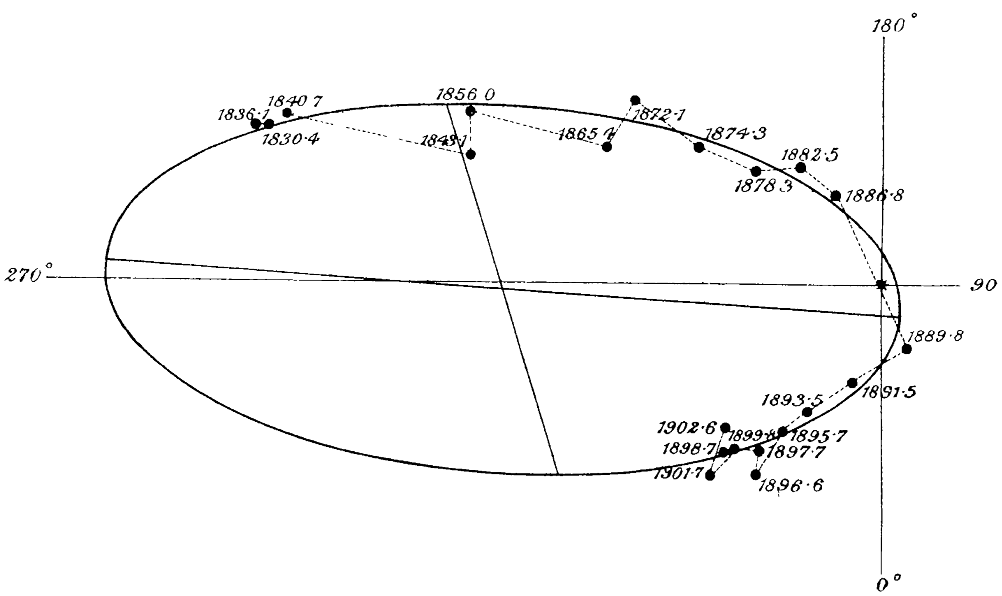
Σ 2525

FIG. 1.

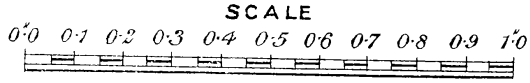


Σ 2525 (Apparent Ellipse)

FIG. 2.



SCALE



Date.	Position Angle.	Distance.	Observer and Number of Nights.
1872·08	233°·6	0″·63	Dem. 1, OΣ 1.
1874·34	233·0	0·47	Wilson and Seabroke 9, Ferrari 1, Gledhill 1, Dem. 3, Schiap. 5.
1878·33	228·6	0·35	Schiap. 5, Dem. 1, Hall 3, Seabroke 2.
1882·52	215·8	0·29	Schiap. 10, Doberck 2, Engelmann 8, Perrine 4.
1886·80	210·0	0·22	Schiap. 2, Hall 1.
1887·71	single		Schiap. 1.
1888·78	single		HΣ 2.
1889·78	24·1	0·15 ±	HΣ 1.
1891·49	343·8	0·21	β 4, Hough 1, HΣ 1.
1893·46	329·3	0·30	β 1, Comstock 3.
1895·68	326·2	0·36	Dyson 1, Lewis 2, Glasenapp 2, Comstock 3.
1896·63	326·9	0·47	Lewis 4, Comstock 3.
1897·66	323·3	0·42	Lewis 5, Aitken 3.
1898·65	317·9	0·47	Lewis 3, Bryant 1.
1899·79	319·1	0·45	Aitken 3, Lewis 4, Bryant 3, Bowyer 3.
1901·65	318·1	0·52	Lewis 3, Bowyer 1.
1902·63	313·2	0·43	Lewis 1, Bowyer 3.

These means are plotted in fig. 1 (Plate 14) on the assumption that the motion is rectilinear; and it is evident that up to 1893 the measures are well satisfied by an annual motion of ″·024 along the line AB in the direction of 85°·5.

The following is an analysis of this motion:—

From	1830·4–1843·1 an annual motion of	″·030
	1843·1–1856·0 ,, ,, ,, ,,	·025
	1856·0–1872·1 ,, ,, ,, ,,	·021
	1872·1–1882·5 ,, ,, ,, ,,	·019
	1882·5–1891·5 ,, ,, ,, ,,	·027
	1891·5–1902·6 ,, ,, ,, ,,	·014

The observations since 1893, however, cannot be thus satisfied. Moreover, the pair has been under constant observation at Greenwich, and although the difference of magnitude is but slight, observers are unanimous in placing the companion in the fourth quadrant.

In fig. 2 (Plate 14) the recent observations are plotted in the fourth quadrant and the apparent ellipse drawn. This also explains why in 1887 and 1888 no duplicity could be detected, and that

the measure of 1889 is in the first quadrant, as recorded by Hermann Struve. No doubt can then remain that the pair form a binary system.

An investigation of the apparent ellipse by Herschel's method yields the following elements of the true ellipse :—

$$e = \cdot 957 \qquad a = 1''\cdot 41$$
$$\Omega = 25^\circ\ 0' \qquad T = 1887\cdot 9$$
$$\gamma = 57^\circ\ 4' \qquad P = 306\cdot 7 \text{ years}$$
$$\lambda = 76^\circ\ 23'$$

The following table gives a comparison between the observed positions and the computed, using the above elements :—

Date.	Angle Observed.	Angle Computed.	θ O−C.	Dist. Observed.	Dist. Computed.	ρ O−C.
	°	°	°	"	"	"
1830·4	255·9	255·7	+ 0·2	1·33	1·30	+ ·03
36·1	255·5	254·2	+ 1·3	1·30	1·25	+ ·05
40·7	253·5	253·0	+ 0·5	1·27	1·20	+ ·07
43·1	252·5	252·5	0·0	0·89	1·16	− ·27
56·0	247·0	249·2	− 2·2	0·92	1·05	− ·13
65·4	243·0	244·4	− 1·4	0·63	0·86	− ·23
72·1	233·6	240·4	− 6·8	0·63	0·71	− ·08
74·3	233·0	238·7	− 5·7	0·47	0·66	− ·19
78·3	228·6	234·5	− 5·9	0·35	0·54	− ·19
82·5	215·8	227·4	− 11·6	0·29	0·40	− ·11
86·8	210·0	203·2	+ 6·8	0·22	0·14	+ ·08
87·7	single	135·7	...	...	0·05	...
88·8	single	14·6	...	...	0·12	...
89·8	241	359·4	+ 24·7	0·15 ±	0·17	− ·02
91·5	343·8	346·6	− 2·8	0·21	0·23	− ·02
93·5	329·3	335·3	− 6·0	0·30	0·30	·00
95·7	326·2	328·2	− 2·0	0·36	0·36	·00
96·6	326·9	325·9	+ 1·0	0·47	0·39	+ ·08
97·7	323·3	323·4	− 0·1	0·42	0·41	+ ·01
98·7	317·9	321·2	− 3·3	0·47	0·43	+ ·04
99·8	319·1	319·3	− 0·2	0·45	0·45	·00
1901·7	318·1	316·3	+ 1·8	0·52	0·49	+ ·03
02·6	313·2	315·1	− 1·9	0·43	0·50	− ·07

The pair being now separated by 0"·5 is within the reach of most double-star observers, and should receive constant attention.

1903 *April* 4.

A Standard Scale for Telescopic Observation.
By Percival Lowell.

(*Communicated by the Secretaries.*)

Professor W. H. Pickering was quite right in calling attention to the origin of "A Standard Scale for Telescopic Observation." It was devised by him, although he modestly does not mention himself directly in the matter; and he deserves great credit for having devised it, as it is the only absolute scale—that is, the only one independent of the personal equation—which has yet been suggested. For large telescopes it needs to be compressed at the lower and expanded at the upper end, as it is a function of the aperture, and for exactness it must be supplemented by a record of the bodily motion as shown by Mr. A. E. Douglass: "Atmosphere, Telescope, and Observer" (*Popular Astronomy*, 1897), and "Scales of Seeing" (*Popular Astronomy*, 1898).

Since it was first put in practice—at Arequipa and Flagstaff—much further knowledge about what makes good or bad seeing has been obtained through the study of the air-currents by Mr. A. E. Douglass, for some years connected with this observatory. To his research we are indebted for the practical results, though not for the original detection of the air-currents which make or mar the seeing, and for the practical results which flow from their observation. In the course of this research it has thus been found, for example, that clear-cutness of the limb is not a sure test in planetary observations. The air-currents may be such as to give a sharp limb and poor detail definition, or a poor limb and good detail, or to show both limb and detail clearly. It seems to be a matter of the size of the waves. An observer, judging of a planet as a whole, might easily suppose he was having seeing good enough to show certain detail if it existed, whereas he was not; and *vice versa* he might distrust realities as illusions.

It seems to be absolutely necessary to refer to the stars as a criterion for the reason that otherwise too much is left to the discrimination of the observer. Reference to the condition of the terminator or to any other special feature is too much a matter of individual skill to be generally advisable. A scale to be universal must be as simple and impersonal in practice as it is correct in principle.

Lowell Observatory, Flagstaff, A.T.:
1903 *March* 9.